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IN THE DISTRICT COURT OF GUAM

TERRITORY OF GUAM

FLORENCIA Q. LEWIS, Plaintiff, vs. UNITED STATES OF AMERICA, Defendant.	CIVIL CASE NO. 05-00026 (Federal Tort Claims Act) PLAINTIFF'S FIRST AMENDED TRIAL BRIEF; TABS "1 – 8"; CERTIFICATE OF SERVICE

PLAINTIFF'S FIRST AMENDED TRIAL BRIEF

Plaintiff Florencia Q. Lewis ("Mrs. Lewis"), by and through her attorney, Wayson W. S. Wong, Esq., of the Law Offices of Wayson Wong, A Professional Corporation, provides this Court with her First Amended Trial Brief. The First Amended Trial Brief is the same as Plaintiff's Trial Brief filed on July 6, 2007, except that it corrects the caption (indicated as the Superior Court) and contains the Tabs "1 – 8" referenced but not included with Plaintiff's Trial Brief. In Plaintiff's Trial Brief, plaintiff's counsel mentioned that such tabs would be provided.

ORIGINAL

This is a medical malpractice case brought pursuant to Federal Tort Claims Act on behalf of a woman who went in to address a perceived kidney blood flow problem and ended up with a permanently paralyzed left arm and hand.

To explain to this Court the facts applicable to this case, Mrs. Lewis provides this Court with excerpts from her May 25, 2007 Confidential Settlement Letter to the Magistrate Judge for this case. The facts are the facts and can and should be the same whether recited in that letter or in this trial brief. As this Court will see, there is a substantial disagreement as to the facts as set forth by Mrs. Lewis and those set forth by the defendant. In terms of the law, Mrs. Lewis has no disagreement with the applicable law as recited by defendant, except the Hawaii law regarding informed consent is applicable and should also be cited to this Court. Mrs. Lewis will do that after her recitation of the facts.

That letter reads in part as follows:

> I represent Florencia Quenga (maiden name) Lewis, a Guam native. She is a 68 year old grandmother. She married Jesse Lewis, who was a senior NCO in the Marine Corps. Together, they served our country by his direct service and her keeping the home fires burning. She retired from working and now lives in Yigo. She looks younger than her years, but one will be distracted and consider her older because of the deformity and disability of her left arm and hand. She is one of the nicest ladies I have met and did not deserve to go through this nightmare.
>
> In August 2002, the doctors at Guam Naval Hospital sent her to Tripler for blood pressure concerns and to be considered for a renal artery stent to improve blood flow to her kidneys. Instead, she ended up with a paralyzed, terribly painful left arm and hand because of permanent nerve damage there. Tripler's failure to timely act killed many of the nerves in her left arm and hand.
>
> * * * [relating to settlement]

I. The Government's Liability

Dr. Manish Varma, the Tripler interventional radiologist, was the doctor whose omission was below the standard of care. He should have recognized the compartment (that compartment is described in the next succeeding paragraph) syndrome that developed when he pulled the needle out of Mrs. Lewis' brachial artery on August 13, 2002. Within at least four hours, he should have called for an orthopedic surgeon or vascular surgeon consult to open that compartment to relieve the pressure on the nerves in that compartment and prevent them from dying.

The compartment involved is a small straw like structure in the upper arm. The brachial artery runs through it, together with certain nerves, including the median nerve. Bleeding from that artery into the compartment can cause pressure within that compartment. When the needle or catheter was pulled out of Mrs. Lewis arm on August 13, it left a hole in her brachial artery from which blood flowed out into the compartment and probably into the areas of her upper arm surrounding the compartment. Dr. Varma applied hand pressure to try to stop such bleeding, but he apparently was unsuccessful; and a large hematoma developed in her left upper arm. The pressure of the blood in the compartment acted like a tourniquet that put pressure on the nerves in the compartment. Such pressure reduced and/or prevented oxygen from getting to the nerve cells, and that initially damaged and then eventually killed many of them. To avoid serious permanent injury, a surgeon needed to cut into her arm and then cut into or open the compartment to relieve the pressure to protect the nerves. In this case, that was not done because Dr. Varma should have but failed to recognize this compartment syndrome and therefore failed to call for the appropriate help.

Dr. Patricio Rosa, Tripler's vascular surgeon, confirmed that Dr. Varma was negligent. Dr. Rosa was finally called in to help on August 16, 2002. This was after Mrs. Lewis had been discharged from Tripler and was on her way back to Guam. At the airport, she was denied boarding on the plane because her blood pressure was too elevated. She had to be readmitted to Tripler for that problem. But no one had given her left arm and hand problems and pain the proper attention they deserved. By the time Dr. Rosa saw her, he felt it was too late for him to do anything for her.

The Government's expert is Dr. Darren Schneider. Among the references he relied on was the authoritative article entitled The

Medial Brachial Fascial Compartment Syndrome Following Axillary Arteriography" by doctors Bryan E. Tsao and Asa J. Wilbourn in Neurology 2003 (journal), a copy of which is enclosed under Tab 1 in the white folder submitted with this letter (all tab referenced information is in that folder). In that article, after extensive research and investigation, the authors conclude that if the syndrome is discovered and explored (surgically) within 4 hours from the onset of symptoms, the patient is up to "...8.3 times more likely to recover completely than those who are only observed or treated with delayed surgery (performed more than 4 hours from onset of symptoms." See page 1041 of that article.

That is why Dr. Rosa testified it was too late to do anything for Mrs. Lewis at the time he saw her about three days after the onset of her symptoms. But Dr. Rosa said that on the scenario of "You pull out the sheath, a large hematoma develops, there's a loss of sensation in fingers, loss of strength in fingers, and pain that develops, such that narcotic mediation is needed to control it...," that would be a "**fire alarm to call for the vascular surgeon for help**." Again, this is the Government's doctor, not one of Mrs. Lewis' experts. A copy of the excerpt of Dr. Rosa's December 18, 2006 deposition testimony confirming the above and a summary of his entire deposition testimony are together enclosed under Tab 2.

In this case, that scenario or combination of facts clearly existed; but again, Dr. Varma failed to heed the fire alarm.

Who are Mrs. Lewis experts? They are Dr. Mark Miller and Dr. Jerone Landstrom, both Guam doctors.

We were blessed to have Dr. Landstrom share with us his outrage about what happened to Mrs. Lewis at Tripler. I have known him as an advocate against medial malpractice lawsuits, and I fully expected him to be uncooperative about helping Mrs. Lewis with her case. Instead, I was unable to stop him from talking about how badly she had been treated by her Tripler doctor. A copy of my recorded interview of my first conference with him on May 3, 2004 is enclosed under Tab 3. He concurs with Dr. Miller's opinion that essentially, Dr. Varma was negligent.

We were even more blessed to have Dr. Miller come to Guam about one month before our scheduled April 2007 trial (rescheduled to August 7, 2007 by the Government). He is an interventional radiologist like Dr. Varma. He color charted the major events of what happened to Mrs. Lewis and marked those evens in red, yellow and purple. That color chart is enclosed under

Tab 4. The color charted events show the events that constitute the "fire alarm" described by Dr. Rosa and confirmed by Dr. Landstrom and Dr. Miller. They show that the sheath or needle was pulled at about 1615 hrs., and a large hematoma almost immediately developed. Strong narcotic pain medication (Fentanyl) was given at 1630, and again (Roxicet) at 1700. Dr. Varma himself noted tingling in the fingers (loss of sensation) at 1700. Some two hours later, at 1915, Dr. Varma noted significant weakness in Mrs. Lewis left hand (strength 2-3/5). Those were the symptoms that should have sounded the fire alarm. But Dr. Varma did not hear it. Instead, he did nothing to treat the compartment syndrome, which was fatal to many of Mrs. Lewis left arm and hand nerves. Please note that if he had called in the vascular surgeon at 1915, three hours after the onset of symptoms (4 hours is the threshold), Mrs. Lewis probably would have recovered completely from this ordeal.

As indicated, Dr. Miller has been of the opinion that "...Dr. Varma's failure to call in the appropriate specialist, either a vascular surgeon or an orthopedic surgeon, to assess Mrs. Lewis at 1915 hours on 13 August 2002, was below the standard of care for interventional radiologists." In other words, Dr. Varma was negligent. A copy of Dr. Miller's 18 March 2007 medical report containing that opinion (see last paragraph of it) is enclosed under Tab 5. He also testified at his deposition that pursuant to the Tsao journal article described, it was his further opinion that had such been done, Mrs. Lewis would probably have completely recovered. His opinions were given on the basis of reasonable medical certainty and/or reasonable medical probability.

The Government retained Dr. Darren Schneider as its expert. His April 12, 2007 report is enclosed under Tab 6 to show its shallowness. But please note his "References" on page 1, to the Tsao journal article as being authoritative. Furthermore, please note that he totally disregards the very important symptoms of great pain (needing narcotics to control) and the loss of strength, which was the critical sign or symptom for Dr. Miller. When you close your eyes to the facts, you can say just about anything you want; and that doctor did. The Government has major liability problems.

II. Mrs. Lewis' Injuries and Damages

We filed Mrs. Lewis FTCA claim on August 11, 2004, for $1 million. We set forth the nature and extent of her injuries, treatment and damages to justify that amount. They are again presented in the copy of the excerpt of the FTCA claim to Tripler claims attorney

Laura Waterman entitled More Information about Mrs. Lewis' Injuries and Damages enclosed under Tab 7.

Aside from her permanent left arm and hand problems and disabilities, the most significant problem Mrs. Lewis had during the first two years after the negligence was her reflex sympathetic dystrophy. That dystrophy caused excruciating pain. Thank goodness her pain management doctors were able to arrest it; otherwise her life would have been torturous.

Let us bring that information up to date.

But we need to mention that during the first year following her injuries, Mrs. Lewis was extremely dependent on her family to help her with household chores like cooking and cleaning and to look after and care for her daily hygienic care. She remained on strong pain medications to give her some pain relief and to help her sleep.

In the subsequent years and since 2004, Mrs. Lewis primarily has had to rely on using her right arm/hand to perform simple tasks. Because of her left hand's immobility, inevitably, the excessive and continuous use of her right arm/hand has led Mrs. Lewis to feel the [sic] that her right arm being tired and overused. Because of that, she has also experienced pain in her upper back and shoulder areas. She has used over the counter medication such as Tylenol daily to control her bouts with such pain. For many years, she had to sleep on her back because she could not turn because of her left arm problems. That was uncomfortable and sometimes painful. She lost a lot of sleep because of that. Thankfully, now she sleeps much better. However, she continues to have daily a lot of stress in living her life with her ongoing feelings of helplessness and weakness because of the loss of use of her left arm and hand.

Mrs. Lewis cannot do so many things that have required the full use of her two hands. She cannot wear certain types of clothing because she simply cannot put them on. Bathing takes extra time and ability. Opening bottles and jars are very difficult tasks because often she has to use her foot or teeth to help stabilize the object while she twists, turns and/or rips it open with her right hand. She has been curtailed from eating healthy meals and has resorted to quick less healthy meals because she cannot cook very well; she cannot cut or chop anything that requires two hands.

> Mrs. Lewis still is embarrassed to attend family functions or social events because of the attention and shame she feels when others look at her deformed left hand. At times, she considers herself as less than a complete person and quietly cries about that.
>
> Mrs. Lewis is also sad about not being able to be totally there for her grandchildren. There are so many things she has wanted to enjoy with them that require two good hands. And also there are so many things that she has wanted again to do for herself, like playing the piano, crocheting, cooking, typing and just fixing her bed. She has lost and will continue to lose so much of the past enjoyment of her life.
>
> On March 30, 2007, Dr. Landstrom confirmed that her previous pain syndrome (reflex sympathetic dystrophy) has been completely resolved. But as I mentioned, she still has other aches and pains indirectly caused by her injuries. He also mentioned that there had been only marginal improvement of her left hand function. He additionally stated that she may benefit from future tendon transfers and tenodesis that will improve grasping and opposition in the left hand; but Mrs. Lewis is afraid of further painful surgery. A copy of that medial summary is enclosed under Tab 8.
>
> On March 30, 2007, Dr. Landstrom also updated Mrs. Lewis permanent impairment evaluation. It was his medical opinion that there is no hand pathology present that he could provide beneficial treatment for at this time. He assessed her left hand impairment at 90%, left upper extremity impairment at 100% and the impairment of 60% of the whole person in accordance with the AMA Guides to the Evaluation of Permanent Impairment, the most recent edition. He again noted that future related surgery may be needed. A copy of that evaluation is also enclosed under Tab 8, behind Dr. Landstrom's medical summary.
>
> The medial summary and evaluation by Dr. Landstrom confirm Mrs. Lewis permanent disabilities and this letter confirms her continued, pain, emotional distress, problems and loss of enjoyment of life that she probably will suffer until she leaves this world.

In that letter, Mrs. Lewis should have I should have further emphasized the trauma and the pain and suffering she experienced during the surgery Dr. Landstrom performed in September 2003, to cut away the innervated tendons in

her ring and baby fingers and graft them into her dysfunctional index and middle fingers to try to give her some use of her left hand. Those things were very significant.

The Hawaii law of informed consent is applicable. It was set forth in Tab 7 referenced above as follows.

> With respect to the lack of informed consent issue, in our August 11, 2004 letter to you, we fully discussed Mrs. Lewis' claim for Dr. Varma's failure to obtain her informed consent to the brachial access. We showed how the facts and the law indicate such failure. You have indicated in your letter that we need a medical expert for that claim. We disagree. Hawaii has adopted a patient-oriented standard that requires health care providers to disclose "what a reasonable patient needs to hear from his or her physician in order to make an informed and intelligent decision regarding treatment . . . . " *Carr v. Strode*, 79 Haw. 475, 480, 904 P.2d 489 (1995), citing the seminal case of *Canterbury v. Spence*, 464 F.2d 772, *reh'g denied*, 464 F.2d 772 (D.C.Cir. 1972), *cert. denied*, 409 U.S. 1064, 93 S.Ct. 560, 34 L.Ed.2d 518 (1972). The Hawaii supreme court recently articulated the standard as follows:
>
> Under the patient standard, expert testimony is not critical to demonstrate the amount of information a patient needs in order to intelligently decide between two treatment options. The decision as to what procedure to undergo is ultimately the patient's; to impose a standard of disclosure dictated by experts would be to undermine the decision-making power of patients in similar situations. Therefore, in proving the element of duty for informed consent purposes, **a patient is not required to produce any expert medical testimony regarding what other reasonable [physicians] would have disclosed under same or similar circumstances**.
>
> *Barcai v. Betwee*, 98 Haw. 470, 484, 50 P.3d 946 (2002) (emphasis and bracketing in original). Despite the lack of necessity of any expert medical testimony regarding what a reasonable physician would have disclosed, we already have it from Dr. Varma. To us, the fact that Dr. Varma specifically included the risk of "permanent nerve damage to the left hand and arm" in his description of the risks that he "supposedly" explained to Mrs. Lewis, shows that he, himself, as a doctor, believed that she should

have been advised of that risk. However, the facts clearly indicate that he never advised Mrs. Lewis of that risk.

Mrs. Lewis looks forward to present her case fairly and fully before this Court.

Dated: Hagatna, Guam, July 10, 2007.

Wayson W. S. Wong
Attorney for Plaintiff

Tab “1”

CME

The medial brachial fascial compartment syndrome following axillary arteriography

Bryan E. Tsao, MD; and Asa J. Wilbourn, MD

Abstract—*Objective:* To review clinical and electrodiagnostic features of the medial brachial fascial compartment syndrome, a complication of percutaneous axillary vessel puncture. *Methods:* The authors reviewed electrodiagnostic examinations over a 20-year period. *Results:* This syndrome presents with weakness, pain, and numbness during or following the percutaneous procedure. Injury is characterized by axon loss and involves terminal nerves of the infraclavicular brachial plexus—most often the median nerve alone, followed by combinations of the median, ulnar, radial, and musculocutaneous nerves. *Conclusions:* Early recognition of the medial brachial fascial compartment syndrome may lead to prompt surgical intervention, which, in turn, may prevent permanent nerve injury. Late diagnosis generally results in poor outcome and often results from delayed symptom onset and lack of overt compartment syndrome signs.

NEUROLOGY 2003;61:1037–1041

Percutaneous catheterization of the axillary and brachial artery is used for angiographic evaluation of the heart, thoracic, and abdominal vessels whenever contraindications to the femoral approach exist.[1] Following this procedure, the frequency of injury to various terminal nerves of the infraclavicular brachial plexus (hereafter referred to as nerves) is between 0.4 and 12.7%.[2,3] This is often due to hematoma formation within the medial brachial fascial compartment, resulting in the medial brachial fascial compartment syndrome.[4]

Few descriptions of the syndrome appear in the neurology literature. In order to confirm the nature and distribution of nerve injuries with these circumstances, we report the clinical and electrodiagnostic features of 14 patients with the syndrome: 13 following axillary artery catheterization and a single patient who underwent venography of the basilic vein.

Methods. A retrospective review of electrodiagnostic studies performed in a single laboratory over a 20-year period (1983 through 2002) was performed, selecting for cases involving brachial plexus injuries following axillary arterial catheterization. The electrodiagnostic examination included sensory and motor nerve conduction studies (NCS) and needle EMG. Both sensory and motor NCS were considered abnormal if their amplitudes were absent, reduced when compared to normative laboratory-specific data, or less than 50% on side-to-side comparisons. Muscles examined by needle EMG were considered abnormal if there was evidence of active or chronic motor axon loss; i.e., fibrillation potentials or markedly increased insertional activity, reduced motor unit potential recruitment, or neurogenic configuration changes.

Results. We identified 14 patients (8 men, 6 women) ranging from 28 to 79 years of age (mean 57.2) (table 1). Thirteen were right-handed; one was left-handed. Angiography was performed on the left side in 10, the right in 3, and both sides (right, then left) in 1. Indications for axillary angiography included occlusive peripheral vascular disease (Patients 1, 3, 5, 6, 9, 10, 12, 13, 14), abdominal aortic aneurysm (Patients 7, 11), subclavian thrombosis (Patient 2), parathyroid adenoma (Patient 8), and superior venal cava syndrome (Patient 4, who underwent basilic venography).

Clinical results. Time from procedure to onset of symptoms ranged from immediate (during procedure) to 3 days (mean 12 hours). All cases presented with weakness accompanied by numbness, severe pain, or both. Peripheral pulses (radial, brachial, and axillary) were preserved in all with the exception of Patient 8, whose radial pulse was reduced. A hematoma was present over the medial proximal arm in 9 (Patients 1, 3, 4, 7, 8, 10 through 13), axillary ecchymosis in 7 (Patients 3, 5, 7, 10 through 13). Four patients (1, 4, 10, 12) were receiving IV heparin at the time of the procedure.

Of the four patients who received surgical treatment (Patients 7, 8, 12, 13), none was treated within 4 hours, the stated period of time during which axon loss can be prevented with compartment syndromes.[5] Patient 7 underwent puncture site exploration and brachial fasciotomy less than 24 hours after the vascular procedure and symptom onset. Intraoperatively, a tense neurovascular compartment surrounded by some extravasated blood was noted. Furthermore, " . . . the investing fascia of the axil-

From The Cleveland Clinic, OH.

Presented in part at the 53rd annual meeting of the American Academy of Neurology; Philadelphia, PA; 2001.
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Table 1 *Clinical and electrodiagnostic features of 14 patients with the medial brachial fascial compartment syndrome*

Patient	Procedure side and symptoms	Time to onset of symptoms	Type and distribution of symptoms	Time to EDX	EDX findings	Comment
1	Left	3 d	Numbness, weakness Median	5 wk	Median mononeuropathy	Hematoma Anticoagulated
2	Left	30 min	Numbness, weakness Median	10 mo	Median mononeuropathy	
3	Left	Immediate	Pain, weakness Median	1 mo	Median mononeuropathy	Hematoma and ecchymosis
4	Right	Immediate	Pain, weakness Median	2 mo	Median mononeuropathy	Hematoma Anticoagulated
5	Right	Immediate	Pain, numbness, weakness Median	16 mo	Median mononeuropathy	Ecchymosis
6	Right	Immediate	Pain, weakness, numbness Median	1 mo	Median mononeuropathy	Attempt at right axillary catheterization aborted due to adherence of median nerve to axillary artery
7	Left	Immediate	Pain, weakness Median	1 m	Median mononeuropathy	Hematoma and ecchymosis Underwent puncture site exploration and localized fasciotomy of brachial compartment
8	Bilateral Left	Immediate	Pain, numbness Median, ulnar	12 y	Median and ulnar neuropathies	Improved outcome Hematoma Underwent left brachial arterioplasty and embolectomy
9	Left	Unknown	Pain, weakness Median, ulnar	5 mo	Median and ulnar neuropathies	
10	Left	3 d	Pain, weakness Median, ulnar	3 mo	Median and ulnar neuropathies	Pseudoaneurysm Hematoma and ecchymosis Anticoagulated
11	Left	4 h	Pain, weakness Median > ulnar > radial	6 mo	Median > ulnar > radial neuropathies	Hematoma and ecchymosis
12	Left	6 h	Pain, weakness, numbness Median > radial > ulnar	8 mo	Median >>radial>ulnar neuropathies	Hematoma and ecchymosis Anticoagulated Underwent exploration 3 years later with dense scar overlying median and ulnar nerves
13	Left	6 h	Pain, weakness Median, MC > radial > ulnar	1 mo	Median > MC > radial > ulnar neuropathies	Hematoma and ecchymosis Underwent surgical repair of axillary pseudo aneurysm
14	Left	9 h	Pain, weakness Ulnar	5 mo	Ulnar mononeuropathy	

EDX = electrodiagnostic; MC = musculocutaneous.

lary artery, vein, and nerves was opened the length of the incision without encountering the gelatinous clot that might have been anticipated. Instead, hematoma was simply insufflated throughout the soft tissue in this area." When the brachial fascia was opened, the patient voluntarily remarked that his sensory symptoms immediately improved. His electrodiagnostic examination demonstrated evidence of a severe proximal median motor neuropathy with partial sparing of the median sensory fibers. However, at follow-up 1 year later, this was the only patient with significant improvement of pain, numbness, and, eventually, weakness. Patient 8 experienced loss of the radial pulse and distal cyanosis following axillary angiography for parathyroid adenoma, but refused further treatment. He returned 18 days later because of persistent symptoms and was diagnosed with a thrombosed axillary artery. Although arterioplasty and embolectomy were performed, he had persistent pain as well as weakness in the intrinsic hand muscles; a subsequent electrodiagnostic examination confirmed severe axon loss and median and ulnar neuropathies. Patient 12 had weakness and numbness 6 hours following angiography, and underwent repair for a "bleeding" axillary artery at an outside facility without improvement in motor or sensory symptoms (time from onset of symptom onset to surgery was not documented). Her electrodiagnostic examination demonstrated multiple neurogenic lesions affecting the median, radial, and ulnar nerves. Exploration of the brachial plexus performed 3 years after the initial angiogram revealed "dense scar tissue . . . under the clavipectoral fascia overlying a (hyperemic) median and ulnar nerve." Following neurolysis, her pain was reduced but weakness and numbness was unaltered. Patient 13 underwent axillary angiography for lower extremity claudication. Immediately following the procedure, he had pain and tingling in the fingertips. Over the next 8 hours, at least five serial clinical examinations documented intact radial and brachial pulses and stable hematoma size. However, grip strength, pain, and numbness worsened. A duplex ultrasound revealed a left axillary artery pseudoaneurysm. Surgical exploration approximately 24 hours after the onset of symptoms revealed a region of hematoma and false aneurysm overlying a laceration of the axillary artery, immediately distal to the take-off of the brachialis artery. The patient had persistent weakness, numbness, and pain; a subsequent electrodiagnostic examination revealed multiple neurogenic lesions affecting the median, musculocutaneous, radial, and ulnar nerves.

The remaining 10 patients were treated conservatively; i.e., with pressure bandages, observation, and pain medications.

Duration of follow-up ranged from 3 to 144 months (mean 30); persistent weakness and sensory deficits were present in 11 of 14, including those treated surgically. Of the remaining three patients, two (Patient 1 and 7) had persistent isolated weakness, and one (Patient 9) was lost to follow-up.

Electrodiagnostic results. The median sensory nerve action potentials (SNAP) (recording the thumb, index, and middle fingers), ulnar SNAP (recording the little finger), and radial SNAP (recording the base of the thumb) were performed in all cases. The medial antebrachial cutaneous SNAP was recorded in 9/14, the lateral antebrachial cutaneous SNAP in 11/14, the dorsal ulnar cutaneous SNAP in 3/14, and mixed median-ulnar palmar responses in 3/14. Conduction velocities (CV) for sensory nerves were performed in select cases. Median compound motor action potentials (CMAP) (recording thenar muscles) and ulnar CMAP (recording hypothenar muscles) were obtained in all cases; ulnar motor CMAP recording first dorsal interosseus were obtained in 9/14. Musculocutaneous CMAP were obtained in 5/14, radial CMAP (recording extensor indices proprius and/or extensor digitorum communis) in 4/14, and axillary CMAP in 3/14. In all cases, CV were calculated when recording from distal muscle sites (thenar; hypothenar). Ulnar F-waves were recorded whenever ulnar CMAP were present.

The electrodiagnostic examinations were performed postoperatively in 4 patients (Patients 7, 8, 12, 13) who underwent surgical intervention. Time from catheterization to electrodiagnostic examination ranged from 5 weeks to 12 years (mean 14.6 months) but 10 of 14 were performed within 6 months of the procedure. The sensory and motor NCS showed reduced amplitudes along with relatively preserved latencies and CV in the distribution of the affected sensory and motor nerves, indicative of axon loss. None of the cases showed electrodiagnostic evidence of superimposed cervical radiculopathy or generalized polyneuropathy affecting the upper extremity.

Needle EMG showed both active and chronic motor axon loss, moderate to severe in degree electrically. The following distribution of motor nerve involvement was identified (table 2): median nerve 13, ulnar 7, radial 3, and musculocutaneous 1. One to four nerves were affected in any given patient. The most common presentation was an isolated median nerve lesion (7 of 14). The remaining cases were combinations of median and ulnar neuropathies (3 of 14); median, ulnar, and radial neuropathies (2 of 14); median, ulnar, radial, and musculocutaneous neuropathies (1 of 14); and ulnar neuropathy alone (1 of 14). Thus, the median was the single most affected nerve, either alone or in combination, whereas the musculocutaneous nerve was only rarely involved.

Discussion. The medial brachial fascial compartment syndrome is a potential complication of percutaneous axillary vessel puncture. Although the puncture site typically involves the proximal brachial artery, the terms brachial and axillary are used synonymously throughout the literature. In this report, we refer to both approaches as axillary.

Staal et al. first recognized that infraclavicular brachial plexus injury (specifically, damage to various terminal nerves) could result from this procedure, and that early surgical exploration of the puncture site was indicated in order to prevent the development of permanent neurologic deficits.[6] Since 1966, seven publications with correlative electrodiagnostic results have reported substantial nerve lesions following catheterization of the axillary artery (cumulative n = 14) (see table 2).[2,4,6-10]

In 1989, Smith et al. described the medial brachial fascial compartment as a tough brachial fascia extending from the axilla to the shoulder (figure).[4] The axillary sheath, which contains the axillary artery, vein, and infraclavicular brachial plexus, lies within

Table 2 Patterns of affected motor nerves defined by the needle electrode examination

Report	Number	M alone	U alone	M/U	M/U/R	M/U/R/MC	M/U/R/MC/A	U/R/MC/A/S
Tsao and Wilbourn	14	6	1	2	1	1*		
		1*		1*	1*			
Smith et al.[4]	2			1				
				1*				
O'Keefe[9]	1				1			
Lyon[7]	4			1*	1	1		1
Benjamin and Nagler[10]	1			1				
Molnar and Paul[2]	2	2						
Dudrick et al.[8]	2	1					1	
Staal et al.[6]	2			1				
				1†				
Total (%)	28	10 (36)	1 (4)	9 (32)	4 (14)	2 (7)	1 (4)	1 (4)

All studies represent preoperative electrodiagnostic EDX results; postoperative results were listed only if no intraoperative complications were documented or no preoperative EDX was available. Overall frequency (%): median (M) 26/28 (93); ulnar (U) 18/28 (64); radial (R) 8/28 (29); musculocutaneous (MC) 4/28 (14); axillary (A) 1/28 (4); suprascapular (S) 1/28 (4).

* Postoperative results.
† Direct faradic stimulation only.

this compartment. The syndrome results from hematoma or pseudoaneurysm formation within the compartment, and represents a common endpoint to a variety of procedures. Whereas the most common identified cause is percutaneous catheterization of the axillary artery, the syndrome has also been described following axillary regional anesthesia, artery cannulation, and trauma.[11-13] In addition to the medial brachial fascial compartment syndrome, axillary angiography may result in arterial occlusion and cerebral complications (i.e., seizure and stroke).[14] Of these, injury to the infraclavicular brachial plexus appears to remain under-recognized, particularly by non-neurologists.

There are several reasons why the medial brachial fascial compartment syndrome is underdiagnosed. First, motor and sensory symptoms may be significantly delayed (up to 15 days) from the time of the procedure.[2] Second, there is a misperception that a compartment syndrome results in overt vascular compromise causing diminished distal peripheral pulses. On the contrary, direct compression of a nerve can affect its microneural blood supply, altering the endoneurial fluid milieu even though tissue pressures (>30 mm Hg) are well below those required to cause loss of palpable pulses (>120 mm Hg).[15] Thus, a tense neurovascular bundle within the compartment may be the only finding at surgery, as was demonstrated in Patient 7. Third, even when the syndrome is recognized, there is a tendency to simply observe the patient if a hematoma or ecchymosis is not visible or palpable. This is a dangerous approach

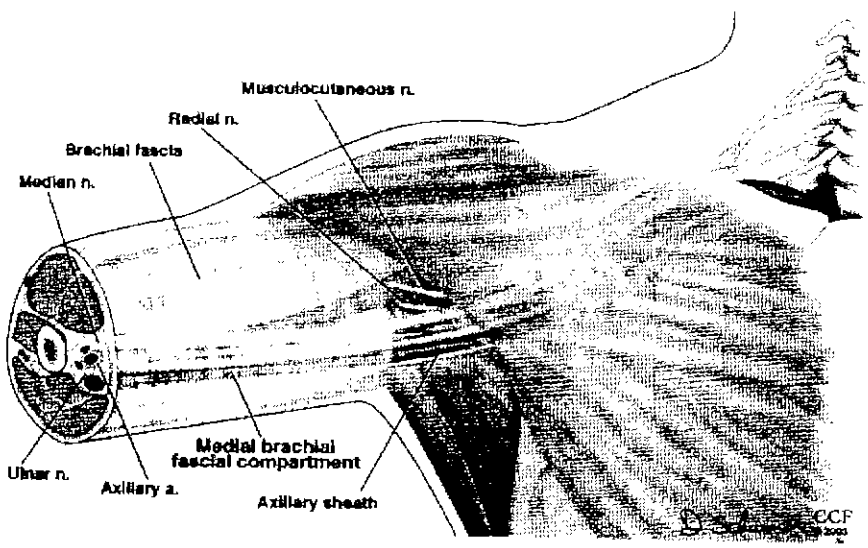

Figure. The terminal nerves exit the medial brachial fascial compartment syndrome in the following order (proximal to distal): supraclavicular, musculocutaneous, axillary, and radial. The median and ulnar nerves remain confined within the medial brachial fascial compartment until the elbow. This anatomic arrangement explains why the median and ulnar nerves are disproportionately affected in the syndrome. Illustration by Dave Schumick. Copyright Cleveland Clinic 2003. Reprinted with permission.

because the size of a hematoma or presence of ecchymosis does not correlate with either the severity of symptoms or degree of nerve damage.[2,4,5]

In our series, an isolated terminal median neuropathy was the single most common presentation. The median nerve was involved in 13 of 14 cases (93%); in 7 of 14 (50%) it was the only terminal nerve affected. Coexisting median and ulnar neuropathies (25%) were the next most common. Of 28 total electrodiagnostic-confirmed cases, including our series and those culled from the literature, the two most common presentations of the medial brachial fascial compartment syndrome also consisted of median mononeuropathies alone (36%) and combined median and ulnar mononeuropathies (32%) (see table 2).[2,4,6-10] The remaining cases included radial and musculocutaneous neuropathies in association with median and ulnar neuropathies. It was unusual for any terminal nerve other than the median to be affected in isolation; we had a single case of solely ulnar mononeuropathy, and Smith reported two isolated ulnar cases and one isolated radial case in their review of the literature.[4]

Several risk factors may predispose patients to develop the syndrome, including the use of anti-anticoagulants, uncontrolled hypertension, use of multiple catheters, prolonged catheterization time, and hyperextension of the shoulder.[16] Postprocedural measures that decrease the likelihood of developing permanent neurologic sequelae include application of pressure at the puncture site for 10 to 15 minutes, avoidance of unnecessary anticoagulants, and close observation with prompt surgical intervention when indicated.[4,16] It should be noted that prolonged elevation and pressure bandages could theoretically increase the ischemic gradient, leading to further increases in intracompartmental pressure.

The electrodiagnostic examination is useful in establishing the distribution and severity of peripheral nerve injuries caused by the medial brachial fascial compartment syndrome. However, its diagnostic role in the acute setting is limited by its inability to detect motor axon loss until days after the effect.

Given that under the circumstances an axon loss lesion rapidly results, it is generally agreed that patients with isolated motor or progressive sensory deficits should undergo immediate puncture site exploration.[2,4,5,7,10] Experimental studies show that an increase of intracompartmental pressures by 30 to 40 mm Hg can result in nerve conduction impairment (i.e., decreased CV) within 6 to 8 hours, whereas axon loss develops after 6 to 12 hours.[17] Depending on when fasciotomy was performed—within 4 hours or after 12 hours—the CV either normalizes or remains abnormal.[18] A case-controlled study demonstrated that patients with the medial brachial fascial compartment syndrome undergoing early (within 4 hours from onset of symptoms) puncture site exploration are up to 8.3 times more likely to recover completely than those who are only observed or treated with delayed surgery (performed more than 4 hours from onset of symptoms).[5] Thus, the golden period during which axon loss can be prevented appears to be 4 hours. Consequently, diagnostic Doppler ultrasound should only be considered if it can be completed within 2 to 3 hours of symptom onset. The use of other imaging modalities (including MRI) is of uncertain diagnostic importance and may delay treatment.

It remains unclear whether surgery is indicated in cases of isolated, nonprogressive sensory involvement. Some authors advocate observation for up to 2 hours in these instances. If symptoms persist beyond this time, the likelihood of attributing the cause to postanesthesia effects is significantly lowered.[5,14] However, delaying surgery may result in prolonged recovery[2,5,7,8]; therefore, early intervention is suggested whenever either progressive sensory or motor symptoms appear.

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Tab "2"

IN THE DISTRICT COURT OF GUAM

FLORENCIA Q. LEWIS, Plaintiff, vs. UNITED STATES OF AMERICA, Defendant.	CIV. NO. 05-00026

TRANSCRIPT OF

TELECONFERENCE DEPOSITION

DR. PATRICIO ROSA

December 18, 2006

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and, if needed, to drain it?

A I will have to say, if -- that hematomas are very common. I would have to say that they only call us when it appears that it is more than just a mild or another -- you know, when it's a more significant problem.

Q Okay.

A So, I would not say that it's every time that happens, because they are very common.

Q Okay. What about in this scenario? You pull out the sheath, a large hematoma develops, there's loss of sensation in fingers, loss of strength in fingers, and pain that develops, such that narcotic medication is needed to control it, would that be a fire alarm to call for the vascular surgeon for help at that time?

A Yes.

Q And that an opinion you have on reasonable medical probability or reasonable medical certainty; is that correct?

A Yes.

MR. WONG: Doctor, can we take a short break? We've been for quite a while and we

LEWIS v. UNITED STATES

SUMMARY OF THE DEPOSITION OF DR. PATRICIO ROSA (Vascular Surgeon)
(Prepared 3/9/07)

Taken on December 19, 2006

DIRECT EXAMINATION BY ATTORNEY WONG

Page No./Line No(s).	Summary of Testimony
45/5-8	Dr. Rosa has never had a compartment syndrome patient with compartment syndrome in the arm (usually it is in the calf) (But it will be clearer that this statement is a matter of how one defines compartment syndrome.)
50/14-16	For compartment syndrome in the arm, most vascular surgeons would defer to an orthopedic surgeon.
50/17-22	Proper procedure is to relieve pressure.
51/1-4	Pressure can destroy soft tissue in the compartment, most commonly nerves; they are the most sensitive; muscles can follow.
52/23-24	Signs and symptoms include: 1. Pain 2. Tension in area 3. Loss of function
53/3-6	Loss of function means loss of nerve function, including loss of sensation and/or loss of motor function.

Page No./Line No(s).	Summary of Testimony
53/18-22	Usually see loss of motor function later, only occurs if the pressure in the tissue is significant and goes long enough.
54/1-4; 54/24-25 55/1-11	At some point in time, you will have tingling and numbness in hand.
55/16-17	Type of pain involved is "very significant pain, not mild pain."
56/20-2	The pain is caused by cutting off the blood flow to the tissue; it becomes "starved for oxygen" and starts dying.
57/23-1	The pain would be in the area of the compartment syndrome.
60/6-11	If the compartment syndrome pressure is great, all the damage can be done in a matter of 4 – 6 hours.
61/11-17	At 40 mm pressure, "very possible" that all the damage can be done within 10 hours.
65/12-14	If you suspect a compartment syndrome, you open.
65/25-3	The ramification of not opening are too great.
66/4-15	You get in quickly, the longer you take, the more damage can occur. If the pressure is high, going in a day later is too late.
67/11-18	Above opinions based on reasonable medical probability or reasonable medical certainty

Page No./Line No(s).	Summary of Testimony
	Dr. Rosa testified about Mrs. Lewis' complaints to him as set forth in his August 16, 2002 (date seen) Consultation Report, pp. 900005 – 900007 (part of the bate stamped Tripler Army Medical Center records in the large binder).
68 & 70	After the sheath removal, she started developing pain in her hand and forearm
	Numbness in her thumb, index and middle fingers. Dr. Rosa believed it to be more of a moderate dysfunction versus numbness.
	According to Dr. Rosa, she said that initially, she could not move all of those first three fingers but their function has improved over the last several days, but still not baseline
	Still has numbness in those fingers
	According to her daughter, swelling decreased significantly
	Sensation was decreased in the palmer aspect of those three fingers
	Pain in L arm at puncture site was severe during the evening after the sheath removal but has subsided slightly over the last few days.
71/1-9	During his exam of her, she could touch her fingers to her thumb (index and middle?)
74/9-13	She still had numbness in her thumb, index and middle fingers.
	Observations during Examination
78/19-22	Entire upper left arm from elbow to her shoulder was ecchymotic.

Page No./Line No(s).	Summary of Testimony
79/14-18	Mild hematoma of left upper arm
79/22-24	Motor function equivalent to strength
80/17-24	First three fingers had strength testing results of 2 or 3 on a scale of 5 being normal.
82/12-19	Found decreased sensation on palmer aspect of those three fingers.
83/8-22	He thought there was injury to a single nerve distribution, probably the median nerve.
83/25-2	He had asked for consultation with a neurologist.
84/20-6	The neurologist would determine the nature and extent of the injury involved.
85/17-25	Diagnosis – possible small hematoma, brachial sheath hematoma, in small space, and not necessarily palpable in exam
86/1-21	Brachial sheath is fibrous cover around brachial artery and other structures (brachial artery, veins and median nerve).
88/14-17	Sheath is small in diameter, as compared with the diameter of the facia around a muscle.
88/24-1	With blood escaping into the brachial sheath, there could be "enough" pressure on the nerve.
90/11-24	A brachial sheath hematoma is a compartment syndrome in the brachial sheath

Page No./Line No(s).	Summary of Testimony
	Signs and symptoms include loss of nerve function – sensation loss, numbness, tingling and loss of strength "Possible, yes"
91/25-3	Pain is another sign or symptom of a brachial sheath hematoma. "Possible, yes"
92/16-23	One is not able to tell whether you have a brachial sheath hematoma "just from the outside"
92/24-2	You cannot tell with just palpation.
93/3-8	The primary signs and symptoms of a brachial sheath hematoma are: 1. Loss of nerve function 2. Pain in area
94/4-8	Dr. Rosa guessed that he has drained about 4 – 5 brachial sheath hematomas.
95/23-7	At the call of a cardiologist or interventional radiologist, he drained 2 – 3 brachial sheath hematomas
96/8-10	That was before he had seen Mrs. Lewis.
96/16-19	Usually, he is called in within hours of the discovery of the hematoma.
96/20-24	The sooner your react to a brachial sheath hematoma, the better it is for the patient.

Page No./Line No(s).	Summary of Testimony
96/25-2	The longer you take, the more damage can occur to the patient.
97/17-18	Once the cardiologist identifies the hematoma, then "most of the time, they call us."
98/11-19	**Upon the scenario of:** **1. Pulled sheath** **2. Large hematoma develops** **3. Loss of sensation in fingers** **4. Loss of strength in fingers** **5. pain such that narcotics are needed to control** **That would be a "fire alarm" to call for the vascular surgeon for help.**
101/23-7	Dr. Rosa was considering two diagnoses: (1) brachial sheath hematoma or (2) cut or partially cut nerve.
102/24-2 & 103/17-19	**If this was a brachial sheath hematoma or cut or partial cut to nerve, at this point [August 16, 2002], not something he would make a difference with.**
104/6-15	**Nerve damage from a brachial sheath hematoma is usually all done within 24 hours.**
104/16-21 & 105/4-10	**Draining of the hematoma at the time he saw her was counter indicated because drainage would serve no significant treatment purposes.**
105/11-2	Dr. Rosa was unaware that nerve function loss and pain started when the sheath was pulled; and if he had known, he would have said more likely she had a brachial sheath hematoma.

Page No./Line No(s).	Summary of Testimony
106/9-16	As indicated, he wanted Dr. Varma to consider a neurology consult, within the next 24 hours.
106/25-5	All of his opinions on medical treatment and assessment and prognosis for Mrs. Lewis's condition, have been based on reasonable medical probability and/or reasonable medical certainty.

CROSS-EXAMINATION BY ATTORNEY SCHWAB

110 – 113	Attorney Schwab focused on the rareness of fasciotomies in the upper arm and not to do one if the patient is improving.

REDIRECT EXAMAINATION BY ATTORNEY WONG

113/23-21 & 115/16-19	His discussion about fasciotomies was not a discussion of the evacuation of a brachial sheath hematoma, which is not a fasciotomy.
116/5-10	If the artery is still bleeding upon evacuation, the vascular surgeon would stitch it up.

Tab “3”

Transcription of Wayson W. S. Wong's Interview with Jerome T. Landstrom, M.D.

May 3, 2004

Re: Florencia Lewis

Dr. Landstrom: This is Dr. Landstrom on May 3, 2004, about 9:35 in the morning regarding Florencia Lewis. We were just talking about your finally getting some information from Tripler regarding her care there. She described to me in great detail what happened to her, so you can go ahead and ask me any questions.

Wayson Wong: Yeah, she did too, but I was trying to figure out what they were doing. But I'm interested in finding out, what was her injury or problem that she came away from. You see, at the end of the medical record that I provided you, the Radiologic Examination Report, they put a sheath, and a stent I guess, a sheath and a stent, I don't know, maybe they're the same thing – into her left brachial artery, in her left arm, and they claim that following, she had a moderate hematoma in the left arm that caused some decreased sensation in the left hand, without pulse loss, and this improved significantly overnight, they say, with a decrease in left upper extremity hematoma. The complications noted in the last page of the report was moderate sized hematoma on the left upper arm that resolved over a course of 24 hours with return of sensation in the left 4^{th} and 5^{th} digits with, however, decreased motor strength. But I don't know what things she got injured. What did she present to you with, as far as injury goes?

Dr. Landstrom: This – first of all, this is an opinion by the person who dictated this. The person who dictated may or may not have been the person who did the procedure. It may have been a resident or somebody else, I don't know. But anyways, it is a rendition of the procedure done. Now, you have to ask yourself, if this was a moderate hematoma, why did she have a brachial plexopathy, meaning several nerve injuries of the brachial plexus that caused paralysis of her left upper extremity. Not weakness, but I'm talking about paralysis and loss of function of her left hand. And the question I have is, if you have a hematoma that's expanding, yes, they have to go in there, and yes, these

are known complications, but just because they're known complications, do we want them to occur, and what is the percentage of those complications to occur? And if someone has a hematoma after surgery --- I'm a surgeon, board-certified in general vascular surgery, board-certified in hand surgery --- and I can tell you, I've done a lot of vascular surgeries in my life, okay?. And if I have a hematoma in the groin after something was done or an aneurysm or some upper extremity surgery, I've got to evacuate that hematoma. If I don't evacuate it and find out why it's there and fix the problem, and it continues to expand, I run the risk of important structures being damaged permanently. And if you have a hematoma in the upper arm, in the brachial artery area, which is close to the armpit area – axilla – above the elbow, up in this area, is where they went ahead with the procedure -- if you've got an expanding hematoma there, and nothing is done about it adequately -- the patient told me they just put a bunch of sandbags on it and iced it down, and it kept on getting bigger and bigger, and she lost sensation in her hand and she couldn't use her hand, and I know the report says "moderate motor weakness" --- that may have initially been the finding, but certainly she progressed to complete multi-nerve paralysis. She affected her median nerve distribution, her radial nerve distribution, and her ulnar nerve distribution. All of them were affected. Not equally, but certainly all of them were affected, and lost function of her hand.

Wayson Wong: Are they all going to be in a sheath in the upper area?

Dr. Landstrom: Well, the artery is in a so-to-speak "sheath." It's called the neurovascular bundle. But as you get up into the armpit area, the axilla, it goes into what's called the brachial plexus, which is, instead of one single bundle of nerves, it splays out. As you exit the neck, it splays into the different nerve roots. It comes out into the axilla, and then it divides into three major branches -- ulnar, median, and radial nerve and then some smaller branches from that. Thus it continues, etc.

Wayson Wong: But then it comes into the neurovascular bundle?

Dr. Landstrom: Yeah, what happens then is that it comes out from your neck, from the spinal cord, and it's C5, C6, C7, C8, T1 roots – they come down, and they form roots, and then they form trunks, and divisions, and then the final

nerve. And the area where she had it done, most of the nerves were beginning to get to their end point, meaning their final portion. And the way she described this to me, this was her whole arm that swelled up like a balloon. So, as a surgeon, if I would have seen that, and I'd seen decreased sensation, loss of sensation in the digits -- it doesn't matter if you have normal capillary refill, it doesn't matter if you have a normal pulse -- because what happens is, in any compartment syndrome – for example, what causes a compartment syndrome? Well, a hematoma can cause that. It swells up, and causes pressure to increase in that area. And that pressure is then transmitted to the surrounding structures, be it muscle, nerve, etcetera. Not until very late do you lose your pulse, and then you usually have more of an extremity that needs amputation. So just because you have pulses doesn't mean – you know, you can have a severe problem and still have a normal distal pulse. That's all over the textbooks. That's routine, okay? Number one. Number two is, so now you note that there's some motor weakness and some sensory deficits. That's compartment syndrome, and you need to open it and you need to drain that. Because if you don't, then you run the risk. Even with doing that, you may end up with some residual problems, but hopefully not as bad. But none of that was done, okay, according to the patient history, and with resultant problem with permanent nerve damage of the partially median, ulnar, and radial nerves. Secondarily, what she had is also a, with the size of the palsy she had, she also had, what looked like to me, possibly an early-stage reflex sympathetic dystrophy, okay?

Wayson Wong: You know, when you're talking about the problems that she had, we're talking about when she first saw you. Because, you know, I know you did a surgery eventually, around September 2003, trying to improve her condition. So I'm not sure whether the physical therapy ameliorated or reduced some of the problems she initially presented with. I'm trying to get a snapshot of, when she first saw you, when she came . . .

Dr. Landstrom: I saw her October 14, 2002.

Wayson Wong: Right, then just before the surgery, because you had her office visit on . . .

Dr. Landstrom: And the date of injury, as I put it, was August 13 [*sic*], 2002. The first thing I did was order occupational therapy, not physical therapy. I wanted a hand therapist. She had a contracture, she wasn't moving her hand, all her joints were stiff, she had not had safe position splinting. And I ordered a nerve test on her, an EMG and a nerve conduction study, and then I re-evaluated her. She, for some reason, I don't know, there --- oh yeah, I know why there's such a gap in time. Because Typhoon Pongsana came December 8, I believe, and just destroyed everything, and then, her house and everything else. And my schedule was so crazy, taking care of post-typhoon traumatic injuries. So finally she came in, and worked back in to see me, in March.

Wayson Wong: Okay, so we've got O.T. at first. But she presented to you with median, ulnar, and radial . . .

Dr. Landstrom: Secondary, in my opinion at that time, was the pressure neuropathy, secondary to the hematoma. And a moderate hematoma wouldn't do that. Believe me, I've done quite a bit of vascular surgery for access, arterial access, of gunshot wounds, stab wounds, and let me tell you, if I had somebody with a stab wound, and for whatever reason, if I fixed him and he had a hematoma post-op, I'll take him right back to surgery and open that arm up and leave it open, just leave it open, so that I'm decompressing the compartment in the forearm or upper arm or the leg, whatever. And from history, that wasn't done, and . . . There's a report that I have here, I haven't seen it before, but I look at this and it's totally inconsistent with a) the history from the patient, and b) the actual end injury result. So, you know, they did take care of her renal artery stenosis, true, but they secondarily got a problem. And in my opinion, it was unrecognized. They minimized the damage and injury, they didn't recognize the fact that the hematoma was significant, they did not recognize the fact that, because of the hematoma she had, could cause permanent nerve damage in several of those nerves as stated.

Wayson Wong: But I noted that the fellow who's doing the procedure, at least the supervising physician involved, was a radiologist or something, as opposed to a surgeon like yourself . . .

Dr. Landstrom: Well, it could have been, yeah, I don't know if it's an interventional radiologist or what, but, for example, in any hospital, you know, bylaws, or whatever, credentialing process, you know, if you're a radiologist doing some procedures, you need to consult a vascular surgeon or general surgeon with vascular privileges, if there's any question about this. And I don't see that happening. The best thing to do is to say, okay, I have got a problem, I have got a hematoma. Maybe the person thought this was the usual standard, and this hematoma wasn't too bad. But obviously it was bad, and in the future, that person could modify their practice by saying, If I have a hematoma that's a little bit more than usual, or if I have a hematoma, I'm going to talk to a vascular surgeon to see what needs to be done. And if they would have done that, I believe this would have been a different outcome, totally. And I've had that done with other radiologists, interventional radiologists, doing femoral artery sticks, they consult with me because a hematoma got out of control. Get in there, and I have to evacuate it, and stitch up the artery. Because, you know, the catheters they use to stent, they dilate the artery, and it can be quite a significant hole. And everybody's a little bit different.

Wayson Wong: So, but in terms of the nerve damage she had, what did she present with? You talked about a total contracture of her left hand.

Dr. Landstrom: I have to review the chart here real quick, but you have the data. Basically, I measured – and I have also the O.T. data – and if you look at the O.T., when they first saw her, it's most important to get all the measurements of her movement, and unfortunately, I have only a fax copy, which is not good. So we need to get that information from GMH, their initial evaluation, when they measure all the active range of motion and passive range of motion, and things like that. And that, basically, let me see, you're going back *[shuffling of papers in the background]* let's see, we have . . . They should be able to get that information for you, because when they do a . . . I have copies here, some summaries, and I'm not sure if they're complete and up to date, but here's one I have written --- nothing from 2002, so what we need to do is get the initial evaluation one. I've got follow-ups after that.

Wayson Wong: Do you know when the initial evaluation was?

Dr. Landstrom: Well, I sent her to therapy October 2002, I don't know exactly the date. I never got a report from the initial one. But I do have my initial evaluation follow up. Now, the measurements were really important, if I can get that and show you the contracture. The last one I have is March 2003 where she'd been going to therapy and I have my first designation of her contractures of her hand on the left and in her wrist. Now, to be fair, I also have, back in November 2002, I have wrist extension, wrist flexion, ulnar radial deviation, but I don't have the hand, because I was waiting for the therapist to give me the full details on that. For some reason, I don't have it in here. *[Looking through papers in chart]* . . . we need 2002. The question is, when did they first see her? And I can't answer that right now, so we need to get that data. You can request it from the hospital.

Wayson Wong: I will. And I might have it already.

Dr. Landstrom: It would be sometime after October 14, 2002. The first date that you have, okay?

Wayson Wong: In terms of pain and limitations, I'm just trying to get a layperson's idea of what she presented with. I remember what she presented with me. She was having pain and problems, especially that contracture. She couldn't open her hand, when I first saw her.

Dr. Landstrom: No. And also, I have a consult here to Guam Pain Management of October 14, 2002, "left upper extremity RSD, secondary to pressure, external neuropathy, hematoma in the upper arm with radial, ulnar nerve median palsies." So . . .

Wayson Wong: What kind of pain do you think she was experiencing on that particular day?

Dr. Landstrom: She couldn't use it. It was anything that touched it – she wouldn't even let me touch it.

Wayson Wong: Okay. I did a case a long time ago concerning reflex sympathetic dystrophy. Something called causalgia.

Dr. Landstrom: Well, there's many different names for it. It's called, the term that's rather used now is complex regional pain syndrome. But you know, it's causalgia – there's about 15 different names for it. But you can use the words complex regional pain syndrome, or RSD --- the rest of them are all synonyms. Basically, how do you cause it? You damage a nerve.

Wayson Wong: Usually the sympathetic nervous system, right?

Dr. Landstrom: Well, it's mediated. It's a combination of both, but yes, you need a sympathetic nerve mediating. And there can be ones that are sympathetic mediated and non-sympathetic mediated, it's not that simple? And I can give you a quick printout on that, if you want to look at it.

Wayson Wong: Okay. But the bottom line for reflex sympathetic dystrophy is, you're going to feel some unusual sensations in your. . .

Dr. Landstrom: You don't have normal sensations and it's painful, **painful**, with any type of movement, sometimes pain with just with ambient temperature changes, sometimes severe pain with just routine touching. And then that leads to contracture, that leads to changes in the circulation area, that may cause hair loss, your hand becomes edematous, if it's not treated adequately in a timely fashion, you can lose the entire function of the extremity or the hand.

Wayson Wong: What I noticed about her -- what I hear physicians call an exquisite coolness – her hand was cold when I touched it!

Dr. Landstrom: Yeah, that's part of the reflex sympathetic dystrophy, because it affects the ability – the nerves are damaged. They cannot regulate temperature of the hand and the response to ambient temperature.

Wayson Wong: If you were to ballpark, and this is difficult to do, an overall function of the hand and arm for her when she presented to you, 100% being what you would consider being normal for a lady this age, can you give me some idea of what the limitations were in her left arm and hand?

Dr. Landstrom: Initially?

Wayson Wong: Yes.

Dr. Landstrom: She had no use of it. She had complete – it was useless, it was 100% loss, and no use. However, if I was to do an evaluation, I'd have to bring her back in and do what's called a Permanent Impairment Evaluation, according to AMA guidelines, which would be different now because she's responding to therapy, responded to my surgery, which included closed manipulation and tendon transfers to allow for – actually, now she can actually pick up something. Before she could not even, she had no use of her hand, she couldn't pick up. Now, she can actually pick up things. She's very happy – not normal. But it's allowed her to use her hand now to assist her dominant hand. Before she did not have that. Her function now is significantly impaired, even though we had a response to therapy and surgery. Most importantly though is her pain is pretty much gone, disappeared. She's now left with a functional impairment of great significance. But again, I want to say that she is much better, and she's pleased that she can at least use the hand for something now.

Wayson Wong: So I take it from you that the occupational therapy did assist in bringing back some of the use of her left arm and hand.

Dr. Landstrom: Yes, minimally. It required a combination of that, surgery, plus further treatment of therapy.

Wayson Wong: How were you treating her pain in that period, between the time she first saw you and the time she had her surgery.

Dr. Landstrom: Well, I consulted Guam Pain Management, and I'd have to find out . . . you know that's out of my field of expertise, but they could do sympathetic blocks, they could start her on Neurontin, give adequate narcotic relief, and all these things. She's not taking any narcotics at this time, so that's you know . . . Also, we can get that information from the doctors treating her, which I can give you.

Wayson Wong: Is that Dr. Kamalam?

Dr. Landstrom: I believe so. Do you have his data?

Wayson Wong: No, I don't. So I'll check with him on that.

Dr. Landstrom: Well, he's moved off island, but Dr. --- no, Dr. Krishnan I think was initially the one. Or was it Dr. Kamalam?

Wayson Wong: It could have been either.

Dr. Landstrom: If Dr. Kamalam's still here, Dr. Krishnan left the island, I think both of them have taken care of her, but I'm not sure which one it was. We can get that information for you today, actually. As long as she's signed a release.

Wayson Wong: Yes, I'm not sure. I think she has, because we've asked for records before.

Dr. Landstrom: Because we don't want to violate any HIPAA regulations.

Wayson Wong: Absolutely not. But in terms of what you saw, I know you did a lot of analysis on that September 12, 2003, office visit you had with her, where you put a chart over there, and tried to document what her limitations were prior to the surgery.

Dr. Landstrom: Yeah, this was a very challenging case. I had to see her several times before I could decide, because she was evolving, she was responding to the treatment modalities, nonsurgical. And of course, surgery wouldn't be done until she had plateaued in those. And that's why my treatment and decision-making process was based on her evolution in these areas. And at some point, I got the feeling, okay, we've kind of maxed-out therapy and pain management, and now we need to increase some problems *[?]*. And with repeat evaluation, I came up with a plan, because her injury was pretty much, you know, her injury was back in August of 2002, so about a year afterwards, you know, it takes for a nerve to regenerate. So by August 2003, she had pretty much reached the maximum . . . That's another reason I waited, too, to see if she wasn't going to spontaneously return more function. Basically I came up to the

point where I said I thought she had reached her current maximal medical improvement with respect to her brachial plexopathy, residual loss of left thumb, left index finger through little finger digit function. And of course, she had increased – she had intrinsic tightness due to her nerve injury to the hand. So, I came up with a plan, I then re-modified that plan and took her to surgery on September 30, 2003. Basically, I did a left little finger, left ring finger flexor digitorum profundis to left middle finger, index finger flexor digitorum profundis transfer to allow function, to allow her to flex her index and middle fingers, because her motors to her ring and little fingers were still okay. It had spared part of the ulnar-innervated _____ *[inaudible]* but the median-innervated, these *[indicating]*, so she was doing this number *[indicating]* -- she could flex her little finger, but her index and middle fingers were completely open, no active range of motion. After surgery, they flexed down, she's now able to use her middle and index fingers to grip things. And I didn't do anything with the . . .

Wayson Wong: What about the thumb?

Dr. Landstrom: I didn't need to do anything with that. I decided to leave that as is to see how she did with that. Plus I did a left index finger and middle finger intrinsic release, because what happened is the ulnar nerve innervations to the interosii *[?]* here caused intrinsic tightness and I released that to allow better flexion of those digits. And of course, she'll have some extension lag, but now she has a more functional hand, and she's very pleased with it. I decided at that point to leave the thumb alone as she is getting along very well with therapy, and I made that decision back in November of that year. I basically said that she had loss of thumb-palmar adduction and IP flexion. She had some, and as time went by, with the improvement of flexion in her index and middle finger, and she has enough use of the thumb, that I asked her, "Are you happy with this?" and she said yes. So I said, okay, therefore, no surgeries would be indicated at this time. Because I want to make sure that I'm going to actually improve her, and I think she's at the point where I don't think any further surgery at this time, at that time would have benefited her any further.

Wayson Wong: In terms of what her limitations are with respect to her hand, are there measured limitations that you've documented later on in your file?

Dr. Landstrom: Sure, you know, motion, metacarpophalangeal joint, proximate and phalangeal DIP joints, left index, ring, and middle fingers, as well as the thumb, wrist motion and things like that, elbow use and shoulder. And also those are documented by therapy. So, I haven't done a Permanent Impairment report yet, but that can be done, and that, pretty much, would put everything in perspective. And also what we could do is a Functional Capacity Evaluation, which hasn't been done either, meaning, what is her ability to carry on with her activities of daily living? For example, her care of herself at home, you know, her husband's passed on, and you know, what can she do? Can she drive, can she do laundry – things like that. Which she pretty much can now, but you can actually document that with a Functional Capacity Evaluation. And then that can, say, make their recommendations along with the impairment.

Wayson Wong: The nerves that you thought were part of a plexopathy, do you believe that they were permanently damaged and will never regenerate?

Dr. Landstrom: Yes, absolutely.

Wayson Wong: So the way you've been able to work around those damaged nerves is to reposition the tendons in her fingers, such that, for those tendons that are innervated, they've been put to use in the two fingers, at least the index and middle finger, such that they can function?

Dr. Landstrom: Yes. I'm using nerves that are still working, not completely, but at least they're working, and transferring those tendons, those motors – you wouldn't call it a muscle, you'd call it a motor, versus sensory -- and those motors were transferred to assist her, and she's very pleased with that. At least she can use her hand now. When I first saw her she had no use of her hand. But you also have to remember there's also the sensory part of the nerve, and that she still has loss of sensation, okay?

Wayson Wong: How were you able to successfully relieve her of the pain?

Dr. Landstrom: Therapy and pain management.

Wayson Wong: In terms of the total amount of nerves we have in the arms and hand, and the damage to them that she's experienced, can you give me an estimate of, okay, "with respect to 100% of the ulnar, radial, median, my feeling is that approximately X amount or percentage was damaged as a result of her injury"?

Dr. Landstrom: All her main nerves – there's three main nerves throughout the hand and forearm – radial, ulnar, and median – and every one of them was damaged.

Wayson Wong: Is there a way to ascertain, just on a ballpark estimate, about how much . . .

Dr. Landstrom: You could do an impairment rating. Impairment rating, and a functional capacity evaluation. And also nerve tests -- EMG/nerve conduction studies, which has already been done, and I think I got a repeat one well out – let me check that. I had a secondary nerve test done by a visiting neurologist/nerve physiologist from Hawaii, I believe. Let me peruse through that *[looking through papers].*

Wayson Wong: Who? Maybe I know him or her.

Dr. Landstrom: McNorton. Dr. McNorton.

Wayson Wong: McNorton. Yeah, we saw his records.

Dr. Landstrom: So . . .

Wayson Wong: But he did one early on.

Dr. Landstrom: Dr. Chen did one, I believe.

Wayson Wong: Okay.

Dr. Landstrom: Chen.

Wayson Wong: Right.

Dr. Landstrom: But I wanted another one done. There's another one. This is Chen. He actually did needle electrode to . . . *[Still shuffling through papers]* Oh, it's Dr. Krishnan who did the pain management, not Dr. Kamalam. Here's a letter of October 24, 2002. Okay, here you go. "Thank you for referring Mrs. Florencia Lewis. I examined her on 10/19/2002." I referred her to him shortly after I saw her, okay? So I saw her on the 14th, he saw her on the 19th, five days later, and he goes, "I agree with your finding of left median, radial, ulnar nerve palsy secondary to compression. She has developed chronic regional pain syndrome, type 2," or RSD type 2. "Start with Neurontin," and she's still taking Elavil, "and if she does not show marked improvement in one week _____ *[inaudible]* I'll try to perform a stellate ganglion block." I don't have any further records than that, okay? Then I have Dr. McNorton, who did her test in follow-up, March 14th, 2003, prior to my surgery. I just wanted to get another test on her before I did anything, because the one by Dr. Chen was done September 2002. So he came back a year later. This was far enough out from her injury. Remember, her injury was August 2002, and this test was done in March 2003, so a little less than a year. So, let's see --- September, October, November, December, January, February, March – seven months. So there's still – this might change a little bit. But . . .

Wayson Wong: Was it . . .

Dr. Landstrom: The interpretation was this, "Left brachial plexopathy with predominant residual involvement of the left median anterior osseous nerves and lesser involvement of the left ulnar nerve," all those being affected. So . . . It's very hard to test for the radial nerve electrodiagnostically, okay? It's more of a clinical, okay? But he did have, test the median nerve and the ulnar nerve. He said "lesser" involvement of the ulnar nerve, he didn't say there was none. That's why I was able to use those for the motor for the index and middle fingers, which were knocked out. The median nerve, that is anterior osseous nerve, okay? It says, "No response to the left median sensory nerve." None, dead. And he didn't test the radial motor nerve, only the superficial radial nerve, which was okay. Which is neither here nor there, it's just sensory on top of the hand, because the motor branch off first, then it goes *[indicating]* . . . But she has some

weakness of that, so that's all we can do, because we don't test the radial nerve motor. It's not that easy to test.

Wayson Wong: In terms of her sensation loss and limitations she has, those will probably exist for the rest of her life?

Dr. Landstrom: Yes. You know, when I saw her last, this year, that's it. It's like having a stroke. After about a year, you can say it's permanent. And now, on February 18, it's gone well beyond a year past her injury. So what she has is permanent. Period.

Wayson Wong: Any further treatment you're recommending for her, aside from the once-in-a-while office visits to see how she is?

Dr. Landstrom: I can't think of anything at this time, except for once in a while, if something comes up. And the one thing I can think of is maybe improving her thumb motion. But she's pleased and happy with that, and I'm not going to --- you know, if she finds that as a functional problem in the future, then maybe something can be done about that, but I don't think so. And the question is, can I improve it more than it is? I won't do anything unless I can convince myself I can make it better. If she's pleased, she's getting along, she can pick up things now -- she couldn't pick up before. So she's come a long way.

Wayson Wong: Yes, thank you.

Dr. Landstrom: May I have this?

Wayson Wong: Yes, you may. That's your copy. I've got one of your notes at the back of this only because I wanted to try and better understand it.

Dr. Landstrom: Do you have this one, the one from Dr. Krishnan? Do you have that?

Wayson Wong: No, I don't. But you know . . .

Dr. Landstrom: She signed off on this, so I can give you that, okay?

Wayson Wong: We just got an authorization to yourself and the Guam Pain Management Clinic.

Dr. Landstrom: Here is the labs -- you don't have that --- and here is his letter. Let me go ahead and get that for you.

Wayson Wong: Thank you, Doctor, and that concludes our interview today.

Tab “4”

Date	Time	event	Motor exam	comment
		Patient diagnosed with hypertension in Guam		
		Captopril test performed previously		
		Travels to Tripler for Evaluation and Rx, eval in clinic by Dr. Varma prior to procedure		
37480	1200 hours	Start procecdure, FIRST HOSPITALIZATION pages 1-242	na	
37480	not spec	Radiologists: Dr. Varna, Dr. Llanso (resident)	no comment	45 cm sheath
		Concious sedation by IR nurse/ Versed and Fentanyl		
		Aortogram: R fem artery		
		left brachial a approach for selective right renal angio/stent	no comment	Placed on heparin
	1730 hours	End procedure, On oxygen in IR suite		
		RECEIVED 2 UNITS BLOOD		
				No groin hematoa reported, most of blood loss in arm, no CT to evaluate for renal bleeding
8/13/2002	830	no hematoma groin and arm recorded by Varma	no comment	observed in ICU3
	1200	Heparin stopped		
8/13/2002	1615	sheath pulled by Dr Varma/?pulled femoral sheath	no comment	coags reported normal
0 min p		hematoma on withdrawal of ba catheter from arm pit to biceps		**how long was manual pressure applied? Not**
sheath pull	1630		no comment	**stated**
	1630	33.5 cm arm circumference L / 26.7 R?/pulses ok, hand cooler	no comment	
		sensory: numbness ; motor ?/ 1634		
	1630		no comment	
		50 mcg of Fentanyl in 2 doses IV (25 mcg each dose) following pull by Dr. Varma		
	1634			
	1645	33.5 cm arm circumference L- peddle	no comment	
	1700	33.5 cm arm circumference L- peddle	no comment	
45 min p		Roxicet 2 tab for pain (oxycodone and acetaminophen)		patient had significant pain after sheath pulled
sheath pull	1700		no comment	when hematoma formed
		DC heparin begin plavix-Dr Varma/ bedside ultrasound performed no pictures		had he ever diagnosed a brachial sheath hematoma, does he know what it looks like on
+45 min	1700		no comment	US
		tingling present-Dr Varma	no comment	
		patient hypertensive- Dr Varma		
			no comment	needed nephrologist for control of BP
		radial and ular pulses intact to Dr Varma	no comment	blood transfusion given for Hct of 29
				Was she tested for weakness
+ 60 min	1715	33.5 cm arm circum/nurse	no comment	
	1730	33 cm arm circum/'nurse	no comment	

		numbness/ rad/uln pulses equal, ? Strength/hand warm/ motor stength 2-3/5/, reports hematoma decreasing but nurses not measure no decrease in arm cirucumferenceVarma		**first mention of motor weakness/numbness reported fingers 3,4,5 but later physical therapy reported fingers 1,2,3 multiple nerves involved**
+3 hrs	**1915**		L<R	
+ 3 45 min	2000	**Motor weakness noted/ nurse**	L<R	
8/14/2002	41	33 cm arm circum, no pain, numbness'nurse	no comment	
		1-2 Strength left/ 3+ R/nurse	L<R	
	400	**1-2 Strength left/ 3+ R/nurse**	L<R	
	500	Coolness dig 4/5 numbness , arm circ 33/n		
	600	Roxicet 2 tab for pain 10/10		persistence significant pain
	600	33 cm arm cirum/n		
	700	33 cm arm circum/'nurse		
	721	Patient cheerful		
	900	33 cm arm circum/'nurse		
	915	Varma reports patient doing well with signif decrease in hematoma with minimum numbness		no comment on need for narcotics or weakness of left upper extremity
	1000	Roxicet 2 tab for pain		recheck this data
	1100	33 cm arm circum/'nurse		
8/14/2002		DISCHARGED 1ST HOSPITALIZATION		
8/15/2002		Out of hospital		
8/16/2002		Rejected for flight to Guam because hypertension		
		Seen by ?Varma in order to admit to medicine,no note from clinic visit, follow up one at 2100 hrs, reports persistent decreased sensation, weakness but IMPROVING	MOTOR WEAKNESS	Bruising reported to be improving, but requested vascular consult
		Admitted to Medicine		
	915	Vascular Consult requested, duplex ultrasound kidney		no residual stenosis
		Vascular consult performed by Dr. Rosa		no intervention recommended, neurology consult recommended
8/16/2002	1545			
8/17/2002		decreased strength digts 1,2,3 ranging 2-3/5		recorded capitella instead of popliteal a
		Developed reflex sympathetic dystrophy and loss of usee of her left arm		

Who ordered pain meds at time of discharge

additional info
Dr Varma = yellow

BP ? In hypertensive person

how long was pressure applied for hemostasis
extent of hematoma indicates there was gap in time from pulling till discovery of hematoma

$A=pi \times r^2$ $A_2/A_1 = 919/507 = 1.8$

Major hematoma develops with arm area increased 1.8 times comparable region of right arm, No Vascular consult requested

10/10 pain No vascular consult requested

Sensory findings noted, No vascular consult requested

how was BP monitored and controlled if necessary, risk factor for brachial sheath compartment syndrome

Motor weakness and sensory findings of numbness, no vascular consult requested

Persistence of motor weakness recorded by vascular surgeon and delay in consultation prevented intervention by vascular surgeon

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, "Four days out from the injury, it would

extremely unlikely that any surgical intervention would
produce any significant improvement."
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Tab "5"

18 March 2007

Dear Mr. Wong,

At your behest, I have reviewed furnished documents in the Lewis case and I think there is evidence for a failure by Dr. Varma to identify the significance of his own observations that charted a progression of symptoms and findings highly specific for median nerve deterioration secondary to a brachial artery compartment syndrome caused by bleeding from a brachial artery puncture with inadequate hemostasis or delayed bleeding in a hypertensive patient after removal of a sheath from the brachial artery.

The major failure in the case management was the failure to act to prevent progression to severe deterioration of the median nerve. The cascade of events starting initially with sensory findings of pain, progressing to additional sensory loss manifested by numbness and tingling in the left hand in the distribution of the median nerve, and followed by distinctive evidence of motor dysfunction manifested by significant weakness of digits 1, 2, and 3 of the left hand, representing the classical textbook distribution of motor function of the median nerve.

If the nerve had been injured during actual puncture the injury would have occurred on August 12 at the time of the procedure. I agree with Dr. Varma that the patient was adequately monitored, with appropriate personal in an ICU setting. It would appear that the extent of neurological injury was identified by Dr. Varma but his observations did not lead to proper and timely consultation for help to preserve the function of the median nerve.

On Aug 12, a prolonged interventional procedure lasting 5.5 hours was performed by Dr. Varma to stent the right kidney after a failed attempt from the right femoral artery approach. During the femoral approach, the guide wire placement in the renal artery caused a non flow limiting dissection of the right renal artery. To protect the kidney from ischemia from the dissection, Dr. Varma entered left brachial artery and placed a 6 French sheath to enable subsequent deposition of two stents in the now dissected right renal artery. Subsequently 2 units of blood transfusion were given for loss of blood associated with the procedure. No reported neurological findings was reported in left upper extremity before or after renal stent placement via left brachial artery puncture prior to the subsequent sheath removal by Dr. Varma at 1615 on August 13, 2002.

1615 hours: After sheath was removed at 1615 hours on August 12th, 2002, the patient experienced

1. 1630 hours: Development of hematoma of left arm from axilla to elbow after sheath pulled that measured 33-33.5 cm till discharge on Aug 14th, 2002 (compared to 26.7 cm on corresponding region of right arm).
2. 1700 hours, chart entry by Dr. Varma:

- Severe pain reported by patient at puncture site in left arm requiring narcotic administration which was initially given at 1700 on 8/13/02 (Roxicet on two occasions)
- Dr. Varma examined patient and recorded patient's report of numbness and tingling 8/13/02.

3. 1915 hours, chart entry by Dr. Varma:

    - Dr. Varma again examined patient and noted the development of significant muscle weakness, fingers 1,2,3 of left hand. Median nerve palsy was not reported by name.
    - No consult for evaluation of motor loss requested by Dr. Varma

EVALUATION:

Given the recent onset of am upper arm hematoma above the elbow causing progressive loss of innervation in the distribution of the median **nerve**, the diagnosis of a compartment syndrome involving the brachial artery sheath was clinically evident. The perception of an undocumented reduction in hematoma size or firmness should not have delayed immediate operative response in this patient since the patient was experiencing a functional disability not a morphological disability. With no evidence of compressive injury below elbow, localization of the injury to the median nerve at the level of the upper arm was highly probable. Moreover, the temporal progression of the injury following sheath removal from brachial artery in upper left extremity would strongly suggest that the patient was experiencing a brachial sheath compartment injury.

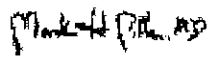
The onset of motor injury to median nerve should require immediate attention by appropriate expert.

1. In my experience with vascular surgeons, the development of a compartment syndrome with any sign of motor involvement indicates a threatened nerve and is a relative emergency. This degree of neurological dysfunction should prompt immediate or urgent decompression of the affected extremity.
2. At Tripler Army Hospital Dr Rosa identified the orthodpedist or neurologist as the local expert in upper extremity neural trauma.
3. Dr. Rosa saw the patient 3 days later on Aug 16th. His testimony indicated that irreversible injury can occur within 2-4 hours after onset of findings in compartment injury to a nerve. He did not recommend surgery for Mrs. Lewis. He recommended an orthopedic or a neurological consult to enhance the care of the patient. The records do not show if this recommendation was received by Dr. Varma.
4. I think Dr. Varma encountered difficult renal artery anatomy requiring five hours to accomplish deployment in contrast to an average deployment time of one to two hours forcing a brachial artery approach using a six French sheath which requires a relative large puncture hole in an artery with a smaller diameter than the femoral artery which is the customary approach route. The brachial artery

approach resulted in favorable anatomy for renal artery stenting but increased the risk of bleeding which did occur. A hematoma per se is not always harmful to a patient unless is uncontrolled and leads to significant blood loss or occurs in a confined space which causes critical injury to the neural and/or vascular constituents of the space. The neural component is subject to irreversible injury requiring close monitoring to prevent this untoward progress as a result of persistent compression of the nerve. A rapid preemptive response is indicated whenever even a subtle finding of motor weakness is observed. The functional impact of the hematoma on the median nerve was not properly assessed in this case.

In my medical opinion, Dr. Varma's failure to call in an appropriate specialist, either a vascular surgeon or an orthopedic surgeon, to assess Mrs. Lewis by 1915 hours on 13 August 2002, was below the standard of care for interventional radiologists. My opinion is based on reasonable medical certainty.

Sincerely yours,



Mark H. Miler, MD

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Tab “6”

April 12, 2007

DARREN B. SCHNEIDER, MD, FACS

RE: Florencia Q. Lewis vs. The United States of America

Documents Reviewed:

1. Medical records of Florencia Q. Lewis, U.S. Naval Hospital Guam, June 2002
2. Medical records of Florencia Q. Lewis, Tripler Army Medical Center, August 2002
3. Medical records of Florencia Q. Lewis from Dr. Jerone T. Landstrom
4. Medical records of Florencia Q. Lewis from Dr. Kwang-Ming Chen
5. Medical records of Florencia Q. Lewis from Dr. Thomas McNorton
6. Medical records of Florencia Q. Lewis from Dr. Suresh Krishnan
7. Medical records of Florencia Q. Lewis from Richard R. Legaspi, Occupational Therapist
8. Selected images from August 12, 2002 renal angiogram and stent procedure at Tripler Army Medical Center
9. Deposition of Dr. Christy Taoka, January 5, 2006
10. Deposition of Dr. Manish Varma, January 6, 2006
11. Deposition of Dr. Manish Varma, June 29, 2006
12. Deposition of Jennifer Alfar, October 3, 2006
13. Deposition of Eileen Itamoto-Gaza, October 18, 2006
14. Deposition of Lisa Peddle, November 30, 2006
15. Deposition of Lisa Peddle, December 16, 2006
16. Deposition of Dr. Patricio Rosa, December 18, 2006

References:

1. Tsao BE and Wilbourn AJ. The medial brachial fascial compartment syndrome following axillary arteriography. *Neurology* 2003; 61: 1037-1041

Statement of Facts:

1. Mrs. Lewis was hospitalized in Guam with a diagnosis of "hypertensive urgency" on June 8, 2002. During this hospitalization she was hypertensive, had an elevated creatinine level of 1.6, and mild hyponatremia.
2. Subsequently, an outpatient captopril renal scintigraphy examination suggested the presence of a right renal artery stenosis (captopril renal scintigraphy exam report not reviewed).
3. Mrs. Lewis was admitted to Tripler Army Medical Center in August 2002 for renal angiography and possible treatment of the right renal artery stenosis with renal artery stent placement.

4. On August 12, 2002 Dr. Manish Varma performed renal angiography. A severe, > 90% ostial right renal artery stenosis was identified and was treated by placement of two stents. During attempts to gain access to the right renal artery from the initial femoral approach a dissection was created in the right renal artery. Subsequently, arterial access was obtained from a left brachial artery approach. Access to the right renal artery was achieved from the left brachial approach and two stents were placed in the right renal artery to treat the ostial stenosis and the dissection. According to the dictated procedure note completion angiography showed good flow in the right renal artery and less then 30% residual stenosis.
5. Following the renal angiogram and right renal artery stent placement both the femoral and brachial artery sheaths were left in place and Mrs. Lewis was transferred to the intensive care unit. She received a continuous heparin infusion overnight and received 300mg of clopidogrel on August 13th.
6. On August 13th the heparin infusion was stopped. At 1530 on August 13th, the prothrombin time was 12.5 (normal range: 10.4-12.7) and the activated partial thromboplastin time was 35 (normal range: 24-38).
7. Both the right femoral and left brachial sheaths were removed after 1530 on August 13th. Manual compression was used to obtain hemostasis at both arterial puncture sites.
8. Following removal of the left brachial sheath, the patient was noted to have a hematoma of the left arm and developed numbness in the fingers of the left hand. Dr. Varma documented the left arm hematoma and numbness in left fingers 3-5 and also reported performing an ultrasound examination of the brachial artery in his note timed 1700 on August 13th. He reported normal pulses in the left arm and a patent left brachial artery by ultrasound.
9. Subsequent notes by Dr. Varma and the ICU nurse on August 13 and August 14 describe stable or improving appearance of the hematoma and decreased numbness in the left hand.
10. The patient was discharged on August 14th, but was readmitted to Tripler Army Medical Center on August 16, 2002 for persistent hypertension.
11. On August 16th Mrs. Lewis was noted to have left hand paresthesias, numbness, and weakness. Vascular surgery and occupational therapy consults were obtained.
12. The vascular surgeon, Dr. Rosa, noted left arm ecchymoses, normal pulses, and decreased sensation and motor strength in the left hand, affecting primarily the 1st three fingers. He opined that either a brachial sheath hematoma or a nerve injury during arterial puncture might have occurred. He did not recommend operative intervention.
13. Mrs. Lewis was discharged from Tripler Army Medical Center on August 20, 2002.
14. Electrodiagnostic testing performed by Dr. Kwang-Ming Chen on September 18, 2002 concluded, "most likely left brachial plexopathy."
15. Evaluation by Dr. Thomas McNorton dated October 3, 2002 diagnosed "left brachial plexitis predominantly affecting the middle and lower trunks as well

as concurrent pain syndrome such as reflex sympathetic dystrophy may be present".

16. Assessment by Dr. Suresh Krishnan dated October 21, 2002 listed diagnoses of left median, radial, and ulnar palsy secondary to compression and development of complex regional pain syndrome type 2.
17. Assessment by Dr. Jerome Landstrom in letter dated November 4, 2002 – "Left upper extremity proximal median, ulnar and radial nerve palsy due to hematoma and application of external compression to treat hematoma all as a complication for the treatment of renal artery stenosis. This has caused significant left upper extremity impairment with evidence of early reinervation." Treatment recommendations included, serial examination with electrodiagnostic testing, continued OT, and possible future tendon transfer operation to improve hand function.
18. On September 30, 2003 Dr. Jerome Landstrom performed a tendon transfer operation to improve function of Mrs. Lewis' left hand.
19. In a letter dated May 29, 2004, Dr. Jerome Landstrom opined that Mrs. Lewis had "reached maximal medical improvement." He calculated a "permanent impairment evaluation rating of left hand impairment of 92%, upper extremity impairment of 100%, and whole person impairment of 60% in accordance with the AMA Guides to the Evaluation of Permanent Impairment."

Conclusions:

Based upon my review I conclude that Mrs. Lewis developed a hematoma in the left arm following removal of an arterial sheath and that the hematoma caused nerve compression, which was ultimately responsible for permanent injury of the left median, ulnar, and radial nerves.

Nerve injury is an uncommon complication after percutaneous brachial artery access and descriptions in the medical literature are limited. Nerve function may improve if the hematoma is surgically evacuated; however, development of permanent nerve injury is common even in patients treated with surgical intervention.

With regard to the specific care that Mrs. Lewis received at Tripler Army Medical Center:

1. Renal angiography and stent placement for evaluation and treatment of renovascular hypertension was medically indicated.
2. After the renal artery dissection occurred and the dissection could not be treated from a femoral approach, it was appropriate to immediately convert to a brachial approach for preservation of right kidney function.
3. Appropriate precautions were taken to prevent the development of a hematoma after removal of the brachial sheath, including: 1) discontinuation of heparin anticoagulation, 2) verification of normal clotting parameters, and 3) application of prolonged manual compression.
4. Serial physical exams were performed following sheath removal.

5. The symptoms of numbness in the left hand after sheath removal were documented to be improving in chart notes. Therefore, it was reasonable to continue close observation without surgical intervention.

It is my opinion that Mrs. Lewis received reasonable and appropriate care at Tripler Army Medical Center. Her nerve injury was unfortunate, but nerve injury is an inherent risk of percutaneous brachial artery access procedures. Her treatment did not deviate from accepted standards of medical practice and her complication was not a result of medical negligence or malpractice.

Tab “7”

risk of stroke, blindness and/or permanent nerve damage to the left hand and arm, which were included in Dr. Varma's Radiologic Examination Report but which Mrs. Lewis was never advised of, many reasonable people would not have consented to such treatment. The facts indicate no other cause, much less any superseding cause. Accordingly, a judge should have no problem in finding the doctor liable for Mrs. Lewis' injuries and damages for failure to obtain Mrs. Lewis' informed consent to the procedures that resulted in such injuries and damages.

Again, under the principles of vicariously liability, the United States has liability for Dr. Varma's liability for his failure to obtain Mrs. Lewis' informed consent.

As you can see, there are numerous reasons to question the information in Dr. Varma's RE Report.

IV. MORE INFORMATION ABOUT MRS. LEWIS' INJURIES AND DAMAGES

A. Treatment, Pain and Problems

Mrs. Lewis' left arm and hand paralysis and pain were terribly frightening to her. She trusted the doctors at Tripler to take good care of her. But no one had taken the time to carefully and fully investigate those major problems until she returned to Guam. By then, it was probably too late to do anything about the permanent nerve damages she had sustained.

As indicated, upon a referral from the Guam Navy health care providers, on September 18, 2002, Dr. Chen confirmed such damages.

The Navy health care providers also referred her to neurologist Thomas McNorton for treatment. He first saw Mrs. Lewis on October 3, 2002. Her chief complaint was left arm pain and weakness. It was his impression that she had left brachial plexopathy and possible concurrent reflex sympathetic dystrophy. The latter could very well have been the cause of her bitter pain. He used Neurontin to treat her pain and wanted to refer her for hand surgery and pain management. *See* Dr. Thomas McNorton's records, copies of which have been obtained and provided under Tab 5 in the white folder.

Dr. Landstrom first saw Mrs. Lewis on October 14, 2002. He mentioned that at that time, she had no use of her left arm and hand. *See* Dr. Landstrom's statements, p. 8. She also had abnormal sensations there, with pain, sometimes severe pain with just routine touch. *See* Dr. Landstrom's statements, p. 7. He had diagnosed her as having left brachial plexopathy and RSD (reflex sympathetic dystrophy). *See* Dr. Jerone Landstrom's records, copies of which have been obtained and provided under Tab 3, and *see* Dr. Landstrom's statements, p. 6. He sent her for occupational therapy to try to

reduce her disability, and he sent her to Guam Pain Management Center to try to help her with her pain. He continued to follow her occasionally for the year following her injuries. He wanted her to stabilize and then he could determine whether his surgical plan for tendon transfers would be worthwhile.

The Guam Pain Management Center, through Dr. Suresh Krishnan, gave Mrs. Lewis good relief from her pain, especially with the use of Elavil with the Neurontin. The progress of her treatment there can be seen in its records as well as those of Dr. Landstrom. Dr. Krishnan's medical record entries appear in Dr. Landstrom's files. *See* Guam Pain Management records, copies of which have been obtained and provided under Tab 6, and those of Dr. Landstrom under Tab 3.

Mrs. Lewis obtained her occupational therapy from Guam Memorial Hospital. It started in October 2002 and continued through April 2003. At the request of her Navy health care providers, it restarted in July 2003 and continued until her left hand surgery with Dr. Landstrom. Thereafter, he ordered further OT from September 2003 until 2/26/04. On May 24, 2004, at the request of Dr. Landstrom, OTR Richard Legaspi provided his Functional Capacity Evaluation of Mrs. Lewis. His conclusion was as follows.

> Mrs. Lewis appeared to have performed the tasks in this FCE with consistent maximum voluntary effort. At this time, she demonstrates significant functional impairments in her left hand and arm affecting range of motion, strength, sensation, and coordination. Despite her attempts to use her left hand in bilateral and bimanual tasks that are a basic part of ADL participation, she is not able to normally integrate her left hand with her right hand. She relies on compensatory strategies and uses the left hand and arm as an assist, rather than as a well-coordinated independently functioning limb. Because of her impairments, Mrs. Lewis is at increased risk of injury, especially for burns (refer to poor sensation results during monofilament testing). She could benefit from adaptive equipment to ease her performance of ADLs in the home (jar opening, for example) as well as promote safety. She could also benefit from mental health counseling to help cope with the grief and loss associated with the injury.

See GMH/Occupational Therapy Records, copies of which have been obtained and provided under Tab 7.

In September 2003, Dr. Landstrom performed surgery on Mrs. Lewis left hand. Essentially, he surgically transferred the flexor digitorum profundis from the left little finger and left ring finger to the left middle finger and left index finger and also did an intrinsic release on the latter two. This was possible because the motor nerves to her

ring and little finger were still okay. Before the surgery, she could flex her ring and middle finger; but she could not flex her index and middle fingers. After the surgery, she could flex them down and grip things. Although her thumb has been dysfunctional, nothing was done for it. *See* Dr. Landstrom's statements, p. 10. Despite being pleased with such improvement, Mrs. Lewis still has the significant residual disability, pain and problems described in the Overview of Mrs. Lewis' Injuries and Damages described in first two pages of this letter.

B. Special Damages

We have been unable to obtain all of Mrs. Lewis' health care expenses related to her left arm and hand injuries. We have included copies of some of the Tricare summaries and other documents showing such expenses under Tab 8. They total $8,770.93. However, we are missing the expenses for the surgery performed by Dr. Landstrom and the related anesthesiologist and hospital charges for the same. We estimate those to be around $10,000. We also have incomplete occupational therapy billings. We are missing page 2 of 4 for the Guam Memorial Hospital billing submitted to Tricare on 1/12/04 (we estimate that to be about $1,000 more) and the billings for such therapy from 11/30/03 to 2/26/04, which could be another about $3,000. When one combines the actual with the estimated expenses, the total can readily exceed $22,000. As soon as the complete actual expenses are obtained from Tricare, they will be provided to you.

C. General Damages

Mrs. Lewis left arm and hand nerves were permanently damaged and will never regenerate. *See* Dr. Landstrom's statements, p. 11.

Her initial pain was terrible, but thankfully that has been markedly improved. However, as indicated, she still has pain with touch and flexion.

The numbness in her hand and wrist is a constant source of discomfort.

Although she has some function in her left arm and hand, according to the AMA, she has a 100% upper extremity impairment. As mentioned, she has significant difficulties with activities of daily living. And her disabilities pose a serious danger to her, especially with respect to driving and burn accidents.

She has suffered through two surgeries because of such injuries. The aftermath of her August 12, 2002 surgery and her recent September 2003 surgery with Dr. Landstrom. In his May 29, 2004 Permanent Impairment Evaluation, Dr. Landstrom indicated that she "...may have further need for hand surgical intervention in the future all related to the initial injury."

Because of her left arm and hand injuries, she has been and continues to be embarrassed, frustrated and depressed. As indicated, rather than her retirement years being years of enjoyment, she faces continuous substantial emotional distress because of those debilitating injuries and their related significant disability, pain and other problems.

D. Total Damages

We have reviewed jury verdicts across our country for similar injuries. Juries have given verdicts in the millions of dollars for similar injuries, but for younger people. Given the very substantial injuries and damages sustained by Mrs. Lewis and such jury verdicts, we believe that her claim has a value of the $1 million claimed.

If we somehow need to file this claim with another office or agency, or if we somehow need to provide additional information to make this claim a valid claim, please advise me immediately. We want to comply fully with any and all requirements for this claim.

We have tried to put all of the pertinent information on the table to try and resolve this case now. As you know, litigation will cause both sides to expend substantial resources. Reasonable settlement is usually the better way to resolve claims. Mrs. Lewis and we are open to any efforts to achieve such reasonable settlement. We will check back with you in about a month to determine whether you are interested in pursuing reasonable settlement. If you have any comments or questions concerning the above matters, please contact me.

Very truly yours,

Law Offices of Wayson Wong
A Professional Corporation

Wayson W. S. Wong

Enclosure (white folder)
WWSW:pjw
cc: Mrs. Florencia Q. Lewis (with enclosure)

Tab “8”

Pacific Hand Surgery Center
Jerone T. Landstrom, MD, FACS
Board Certified in Hand Surgery (ABMS)
Board Certified in Surgery (ABMS)
Member ASSH (www.assh.org)
Specializing in Hand & Microsurgery

Suite 212
633 Gov. Carlos Camacho Rd.
Tamuning, GU 96913

30 March 2007

Wayson Wong, Esq.
142 Seaton Blvd., Suite 203
Hagatna, GU 96910

Dear Mr. Wong,

This is a medical summary on **LEWIS, FLORENCIA**

Assessment

1. Left, brachioplexopathy mainly affecting the median and ulnar nerve distributions secondary to unrecognized compartmental syndrome after Axillary artery cannulation for interventional radiologic procedure. This brachioplexopathy with its axonal dennervation is permanent.
2. Left upper extremity chronic regional pain syndrome type 2 (RSD).
3. Left wrist and hand contractures secondary to # 1 and 2 above.

Procedure(s)

1. Pain management care to resolve chronic regional pain syndrome.
2. Left hand closed capsulotomies; intrinsic release of the left middle finger; left little and left ring finger side-to-side flexor digitorium profundus transfer to the left middle and index finger flexor digitorium profundus tendons.

Summary

1. There has been a complete resolution of the chronic pain syndrome.
2. There has been a marginal improvement of left hand function.
3. The patient may benefit from future tendon transfers and tenodesis affects that will result in improved grasping and opposition in the left hand.

I thank you very much for allowing me the privilege in participating in the care of your patient.

Sincerely,

Jerone T. Landstrom, MD, FACS
LF-1590-L1

Phone: 646-HAND (4263) Fax: 649-2266 Email: handsurgery@guam.net

Pacific Hand Surgery Center
Jerone T. Landstrom, MD, FACS
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30 March 2007

Wayson Wong, Esq.
142 Seaton Blvd., Suite 203
Hagatna, GU 96910

CLAIMANT: LEWIS, FLORENCIA
SSN: 586-03-1590
DOI: 13 AUGUST 2002
MMI: 30 MARCH 2007

Dear Mr. Wong,

You have requested an updated permanent impairment evaluation (PIE) on the above named patient. This was completed on 30 March 2007 after a re-evaluation of the patient at my clinic.

The above named patient has reached maximal medical improvement (MMI) in my opinion. That is to say that there is no hand pathology present that I can provide beneficial treatment for at this time. That is not to say that the patient has no problems.

This patient having reached a point of MMI will not benefit from further care at this time in my opinion. I have therefore calculated a PIE rating of LEFT hand impairment of 90%, upper extremity impairment of 100% and whole person impairment of 60% in accordance with the AMA Guides to the Evaluation of Permanent Impairment, the most recent edition.

In the future, this patient may have problems arise related to the initial injury at which point the patient might require further hand surgical care (related to the initial injury). Therefore, although this patient is at maximum medical improvement at this time, the patient may have further need for hand surgical intervention in the future all related back to the initial injury.

Sincerely:

Jerone T. Landstrom, MD, FACS
MMI-LF-1590-L-2

Phone: 646-HAND (4263) Fax: 649-2266 Email: handsurgery@guam.net

IN THE DISTRICT COURT OF GUAM

TERRITORY OF GUAM

FLORENCIA Q. LEWIS, Plaintiff, vs. UNITED STATES OF AMERICA, Defendant.	)	CIV. NO. 05-00026 (Federal Tort Claims Act) CERTIFICATE OF SERVICE

CERTIFICATE OF SERVICE

I hereby certify that on the date indicated below, a copy of foregoing documents was duly served by personal delivery upon the following at his last known address.

Mikel W. Schwab, Esq.
Assistant U.S. Attorney
Sirena Plaza, Suite 500
108 Hernan Cortes Ave.
Hagatna, Guam 96910

Attorney for Defendant

Dated: Hagatna, Guam, July 10, 2007.

Wayson W. S. Wong
Attorney for Plaintiff